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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,767	01/24/2006	Yuichiro Shindo	OGOSH43USA	2990
270 7590 11/20/2009 HOWSON & HOWSON LLP 501 OFFICE CENTER DRIVE SUITE 210 FORT WASHINGTON, PA 19034			EXAMINER SHEVIN, MARK L	
			ART UNIT 1793	PAPER NUMBER
			NOTIFICATION DATE 11/20/2009	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@howsonandhowson.com

Office Action Summary	Application No. 10/565,767	Applicant(s) SHINDO, YUICHIRO	
	Examiner MARK L. SHEVIN	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 July 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 27, 28 and 30-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 27-28, and 30-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of Claims

1. Claims 1, 27-28, and 30-33, filed December 23rd, 2008, are pending. No claims have been changed since the last office action mailed March 2nd, 2009.

Status of Previous Rejections

2. The previous rejections of claims 1, 27-28, and 30-33 under 35 U.S.C. 103(a) over **Shindo** (US 2003/0062261 A1) in the previous Office action dated March 2nd, 2009 have been maintained.

3. The previous rejections of claims 1, 27-28, and 30-33 under 35 U.S.C. 103(a) over **Murray** (G.T. Murray and T.A. Lograsso, Preparation and Characterization of Pure Metals...) in the previous Office action dated March 2nd, 2009 have been maintained.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 103

4. **Claims 1, 27-28, and 30-33** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Shindo** (US 2003/0062261 A1).

Shindo is drawn to high purity zirconium or hafnium with minimal impurities (Abstract). Shindo discloses in Example 2, beginning at para 0120 a high-purity hafnium sputtering target (claim 4 and Title) with 4N (99.99%) purity level excluding gas components such as carbon, oxygen, and nitrogen (para 0133). Oxygen and carbon are present at less than 500 ppm (claim 6). Table 4 at para 0089 discloses hafnium

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with a carbon content of 30 ppm, nitrogen less than 10 ppm, and oxygen at 100 ppm. (Table 4 at para 0089). Fe, Cr, and Ni are present at less than 10 ppm (Table 4 at para 0089 and Table 4 at para 0131).

Shindo thus teaches a sputtering target or thin formed therefrom made of a high-purity hafnium material with a 4N purity level excluding gas components of carbon, oxygen, and nitrogen. Examples of hafnium are taught with impurities within the claimed ranges and Shindo further teaches that the zirconium content of the high-purity hafnium material should be 0.5 wt% (5000 wt ppm) or less (claim 1). The disclosed zirconium content thus overlaps the range claimed in claim 1 of the instant application and establishes a *prima facie* case of obviousness with Shindo (See MPEP 2144.05, para I: In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists).

Thus it would have been obvious to one of ordinary skill in the metallurgical arts at the time the invention was made, to choose the instantly claimed ranges through process optimization, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980).

5. **Claims 1, 27-28, and 30-33** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Murray** (G.T. Murray and T.A. Lograsso, Preparation and Characterization of Pure Metals, *ASM Handbook, Vol. 2*, (1995), p. 1093-1097) in view of **Shindo** (US 2003/0062261 A1).

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Murray:

Murray discloses (p. 1094, col. 3) that if a low-iron starting metal is used, chemical vapor deposition will produce a condensed vapor with a purity level of 99.999% (5N) and hafnium is one of the metals that have purified by chemical vapor deposition. Murray teaches that if the proper temperature is maintained during the chemical vapor deposition process, oxygen, nitrogen, hydrogen, carbon, as well as many metallic impurities will not be carried over. Murray does not teach the contents of C, O, N, Fe, Cr, and Ni.

Shindo

Shindo in Table 4 at para 0089 discloses hafnium with a carbon content of 30 ppm, nitrogen less than 10 ppm, and oxygen at 100 ppm. (Table 4 at para 0089). Fe, Cr, and Ni are present at less than 10 ppm (Table 4 at para 0089 and Table 4 at para 0131).

Shindo teaches that such impurities hinder the operational performance of semiconductors when impure hafnium material is used a sputtering target (para 0016 and 0017) and that C, O, N, and H gas components should be minimized to prevent the generation of particles during sputtering (para 0014), with the content of impurities being reduced as much as possible (para 0006) -- see also (para 0028-0031).

Regarding claims 1, 27-28, and 30-33, Murray discloses a method for making a very pure Hf material (and thus implicitly teaches a very pure hafnium material as a result) with an overlapping purity of 99.999% (5N), which means an overlapping Zr content of not more than 10 ppm as purity is assumed to mean the Hf content by weight

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percent in a given sample compared to all other elements in the absence of evidence to the contrary.

It would have been obvious to one of ordinary skill in the metallurgical arts, at the time the invention was made, to purify the hafnium material of Murray to minimize the Fe, Cr, Ni, C, O, and N contents to within the claimed range and to use the Hf material of Murray as a sputtering target or thin film as Shindo taught that such impurities should be minimized to prevent the generation of particles during sputtering and to prevent hindering the performance of any semiconductor device containing the deposited Hf material (para 0004 and para 0017) and Hf should be used as a sputtering target because it is a proven gate oxide former for semiconductor devices (para 0002-0006).

Thus it would have been obvious to one of ordinary skill in the metallurgical arts at the time the invention was made, to choose the instantly claimed ranges through process optimization, for the same reasons as stated in the rejections in section 4 above, see MPEP 2144.05.

Affidavit Under 37 CFR 1.132

6. The affidavit under 37 CFR 1.132 filed July 31st, 2009 is insufficient to overcome the rejection of claims 1, 27-28, and 30-33 based upon either Shindo or Murray as set forth in the last Office action for the following reasons:

Per MPEP 2144.05, section III, para I, Applicants may rebut a *prima facie* case of obviousness based on overlapping ranges by showing the criticality of the claimed range, demonstrating a teaching away in the art (MPEP 2144.05, section III, paras 2

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and 3) or by demonstrating new and unexpected results (MPEP 2144.05, section III, para 3).

Mr. Shindo's declaration has established none of these grounds for rebuttal and has attempted to show that Shindo (US 6,861,030) cannot achieve the claimed high purity, low Zr sputtering target.

At page 1, para 6, Mr. Shindo states that the method of D1 "...are unable to intentionally eliminate Hf and Zr as impurities." Yet one sentence later he contradicts this earlier sentence by stating that "Thus it is extremely difficult to separate and refine Hf and Zr only with fluoric acid cleaning and electron beam melting." On page 2, para 1, he then concludes that "...it would be impossible for only Zr to decrease based on EB melting..."

First, Zr need not be reduced alone and need not be reduced by only EB melting and Mr. Shindo has never stated that the sputtering target of instant claim 1 cannot be produced in view of Shindo (US 2003/0062261).

Second, to be of probative value, such evidence should be supported by actual proof per MPEP 716.01(c), however Applicants have failed to provide proof showing that the sputtering target of instant claim 1 would not have been obvious in view of Shindo or impossible to produce.

Opposing evidence showing the feasibility of producing the claimed sputtering target is present in:

- claim 1 of Shindo in stating the Zr content should be 0.5 wt% (5000 wt ppm) or less.

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- Para 0060 of US 2003/0062261 A1 states that Shindo's invention can produce high purity hafnium wherein the content of Zr and impurities excluding gas components is less than 100 ppm can be produced and that high purity hafnium of 4N (99.99%) can be manufactured.
- Para 0065 of US 2003/0062261 A1 states that "it is extremely difficult to reduce Zr in high purity hafnium. Nevertheless, the content thereof can be reduced to 0.5 wt% or less."

Applicants have not rebutted the prima facie case of obviousness established by Shindo as the rejections by showing that the claimed Hf sputtering targets with low Zr content were not suggested by the prior art.

Nothing in Mr. Shindo's affidavit rebuts the prima facie case of obviousness established by the Murray reference.

In view of the foregoing, when all of the evidence is considered, the totality of the rebuttal evidence of nonobviousness fails to outweigh the evidence of obviousness.

Response to Applicant's Arguments:

7. Applicant's arguments filed July 31st, 2009 have been fully considered but they are not persuasive.

Applicants assert (p. 3, para 2 to p. 4, para 1) that Shindo does not recognize the Zr content as being a problem and that it may be disregarded which proves that the instant claims' reduced Zr content is unexpected and critical to the stability of electronic components.

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In response, per MPEP 716.02(d): "To establish unexpected results over a claimed range, applicants should compare a sufficient number of tests both inside and outside the claimed range to show the criticality of the claimed range. *In re Hill*, 284 F.2d 955, 128 USPQ 197 (CCPA 1960). Applicants have provided no such tests and moreover no direct, quantitative comparisons showing an unexpected increase in stability of electronic components only when Zr is in the claimed range of 1 – 1000 wt ppm.

Applicants assert (p. 4, paras 2-3) that the Mr. Shindo's declaration "provides a technical explanation of why Zr content of 1 to 1000 wt ppm cannot be achieved for a highly pure hafnium material following the teaching of the prior art reference."

In response, Mr. Shindo's declaration is insufficient to rebut the prima facie case of nonobviousness established over Shindo and Murray for the reasons stated in section 6, supra.

Applicants assert (p. 7. para 2 to p. 8, para 2) that Hf is not included in Table 1 and that table 2 was not properly interpreted.

Assuming arguendo that applicant is correct on this point, the examiner's position is that the claimed invention remains obvious over the disclosures of Murray in view of Shindo, for reasons as stated above in section 5.

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Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

-- Claims 1, 27-28, and 30-33 are finally rejected

-- No claims are allowed

The rejections above rely on the references for all the teachings expressed in the texts of the references and/or one of ordinary skill in the metallurgical art would have reasonably understood or implied from the texts of the references. To emphasize certain aspects of the prior art, only specific portions of the texts have been pointed out. Each reference as a whole should be reviewed in responding to the rejection, since other sections of the same reference and/or various combinations of the cited references may be relied on in future rejections in view of amendments.

All recited limitations in the instant claims have been met by the rejections as set forth above. Applicant is reminded that when amendment and/or revision is required, applicant should therefore specifically point out the support for any amendments made to the disclosure. See 37 C.F.R. § 1.121; 37 C.F.R. Part §41.37 (c)(1)(v); MPEP §714.02; and MPEP §2411.01(B).

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark L. Shevin whose telephone number is (571) 270-3588 and fax number is (571) 270-4588. The examiner can normally be reached on Monday - Friday, 8:30 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy M. King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

/Mark L. Shevin/
Examiner, Art Unit 1793

November 9th, 2009
10-565,767

/George Wyszomierski/
Primary Examiner
Art Unit 1793